and two leucine zipper domains and has limited homology to yeast *kar5*, which is critical for pronuclear fusion. Thus, *bmb* encodes a novel protein that potentially links the nuclear envelope to the underlying chromatin, and functions to maintain nuclear structure of the cleavage-stage blastomeres, possibly through promoting membrane fusion.

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Program/Abstract # 179
CaMK-II mediates non-canonical Wnt-dependent morphogenic events during zebrafish gastrulation
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In developing zebrafish embryos, formation and elongation of the anterior–posterior (AP) body axis depends on convergent extension, a dynamic process that involves alterations in cell adhesion, polarized cell movements and is regulated by Wnt/Ca^{2+} signaling. Zebrafish encode seven CaMK-II genes each with specific expression patterns during development. Several of these CaMK-II genes are expressed during the first 12hpf; including *camk2b1*, *camk2b2*, *camk2g1* and *camk2g2*. Morpholino knockdown of *camk2b1* and *camk2g1* phenocopies *Wnt5* and *Wnt11* morphants, respectively. *Wnt5* and *Wnt11* are core members of the non-canonical Wnt/PCP pathway and have been shown to regulate convergent extension during early zebrafish development. To evaluate the role of *camk2b1* and *camk2g1* during early development, axial mesoderm, AP body axis length as well as cell shape and dispersal during gastrulation were assessed in *camk2b1* and *camk2g1* morphants. Our results show that both CaMK-II morphants exhibit a decrease in AP body axis length; however each morphant has separate primary defects with *camk2b1* morphants showing broadened expression of axial chordal mesoderm and *camk2g1* morphants affecting tail extension. Global CaMK-II disruption using dominant negative constructs also resulted in defects consistent with roles in convergent extension. With these results, we propose that Wnt11 signaling acts on gamma1 CaMK-II to affect the posterior region of the developing embryo and Wnt5 signals activate *camkb1* to affect media-lateral intercalation necessary for axis formation and extension. Supported by National Science Foundation IOS-0817658.

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Program/Abstract # 180
Coordinated DV and AP patterning by multiple signals in zebrafish
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BMP signaling patterns dorsoventral (DV) tissues progressively temporally along the anteroposterior (AP) axis in zebrafish. To understand this, we tested if altered AP patterning alters the temporal function of BMP signaling to pattern DV tissues along the AP axis. Inhibition of FGF signaling caused expansion of anterior markers posteriorly, which we found were patterned during the same temporal interval as the normal smaller domain by BMP signaling. Overexpression of Wnt signaling caused a shift of posterior markers anteriorly and this expanded posterior tissue was patterned during the same temporal interval as the normally positioned posterior tissue. Thus the temporal patterning of DV tissues along the AP axis by BMP signaling is regulated by AP patterning possibly by FGF and Wnt themselves. We examined the molecular mechanism coordinating DV and AP patterning. Phosphorylations of Smad1 by MAPK and GSK3 inhibit the activity of the BMP receptor phosphorylated form of Smad1, P-Smad1^{Cter}, in Xenopus embryos (Fuentealba et al., 2007), which is postulated to coordinate DV and AP patterning of the ectoderm by BMP, FGF/MAPK and Wnt/GSK3 signaling. To investigate if a similar mechanism regulates P-Smad1/5^{Cter} function in zebrafish, we examined the localization pattern of P-Smad1/5^{GSK3} and P-Smad1/5^{MAPK}. The localization of P-Smad1/5^{MAPK} was maintained in the ventral marginal zone, where FGF/MAPK and BMP/Smad1/5 signaling coexist, whereas P-Smad1/5^{GSK3} was not. These data are consistent with FGF signaling temporally regulating BMP signaling along the AP axis during gastrulation, providing novel insights into the coordination of DV and AP patterning.

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Program/Abstract # 181
A chemokine receptor, CCR7, limits β-catenin activity during zebrafish axis formation
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Formation of the dorsal blastula organizer is one of the key early steps in establishing the proper dorsal–ventral (DV) axis of the vertebrate embryo. Accumulation in the dorsal blastula of β-catenin, an effector of the canonical Wnt signaling pathway, initiates the dorsal-specific gene network and axis formation. We report here that CCR7, a chemokine G-protein coupled receptor, regulates the early steps of DV axis specification in zebrafish embryo. *Ccr7* gene is maternally and ubiquitously expressed, but its transcripts become asymmetrically distributed during gastrulation. Antisense morpholino oligonucleotides (MO) interference with CCR7 translation results in a typical dorsalized embryo phenotype, as judged by tail truncations and expanded or ectopic expression domains of dorsal at the expense of ventral markers. Conversely, injection of synthetic *ccr7* RNA into zygotes causes ventralized phenotypes. Interestingly, injection of *ccr7* MO can often induce incomplete double axes in *ichabod* mutants with reduced levels of maternal β-catenin. Moreover, overexpression of *ccr7* RNA antagonizes the ability of β-catenin to suppress ventralized *ichabod* mutant phenotype. Further molecular analyses suggest that CCR7 negatively regulates the nuclear accumulation of β-catenin by a GSK3β-independent mechanism. In conclusion, we provided several lines of evidence indicating that CCR7 controls embryonic DV axis formation by restricting the dorsal blastula organizer domain in zebrafish. Current efforts aim at elucidating the molecular mechanisms underlying this unprecedented role for a chemokine receptor.

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Program/Abstract # 182
A novel role for fatty acid metabolism in embryonic patterning
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Lipids are emerging as critical signaling molecules in cell biology and embryonic development. To study roles for fatty acids in embryonic development, we focus on enzymes essential for their metabolism. In order to be used by cells, fatty acids must first be activated into their